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(54) **Solar heater**

(57) A solar heater comprises two outwardly domed members (12, 14) joined together at their peripheral edges by ring (15) and sealed by seal (17) to provide an enclosed sealed space (16). A metal heat exchanger plate (18) is located within the space and provided with passageways (20) for the flow of a heat exchange medium between inlet (22) and outlet (24). The space is under a partial vacuum and member (12) is of a material transparent to radiation while the other (14) acts as a radiation reflector.

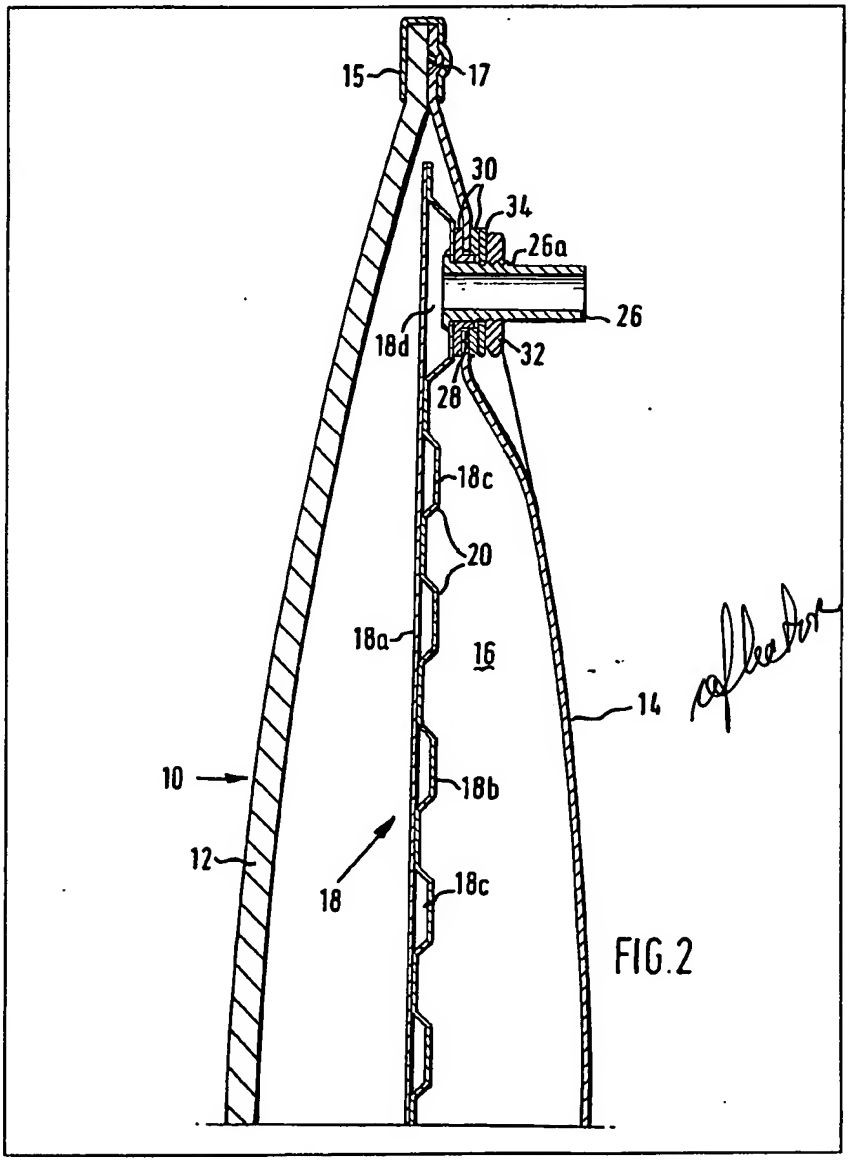

FIG.2

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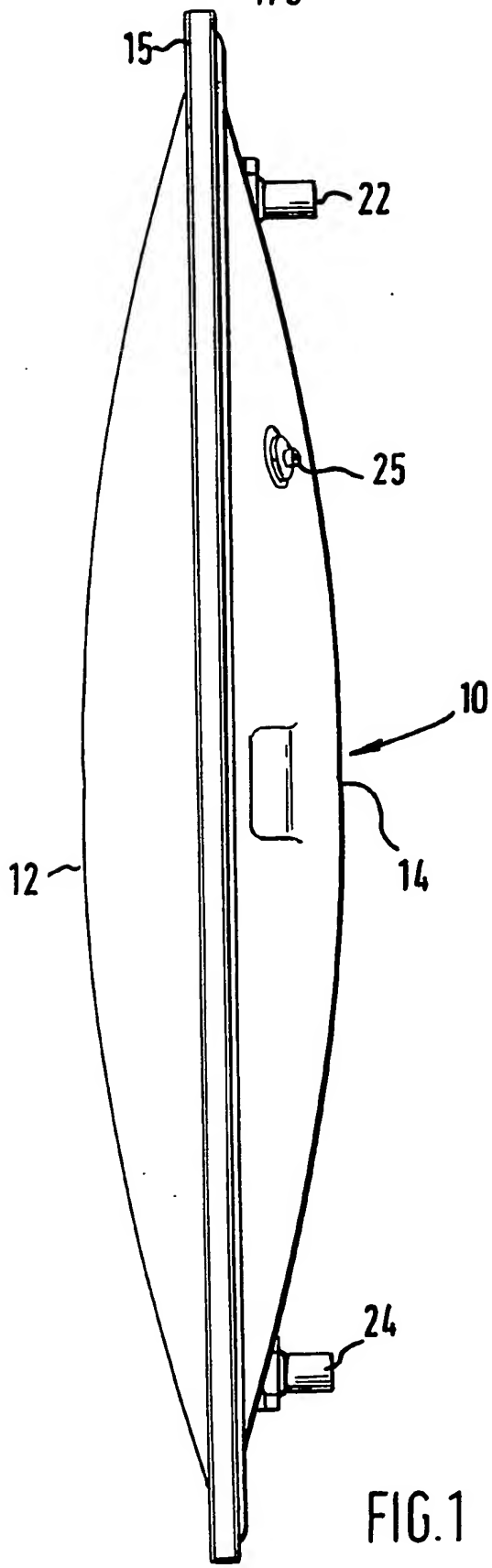


FIG.1

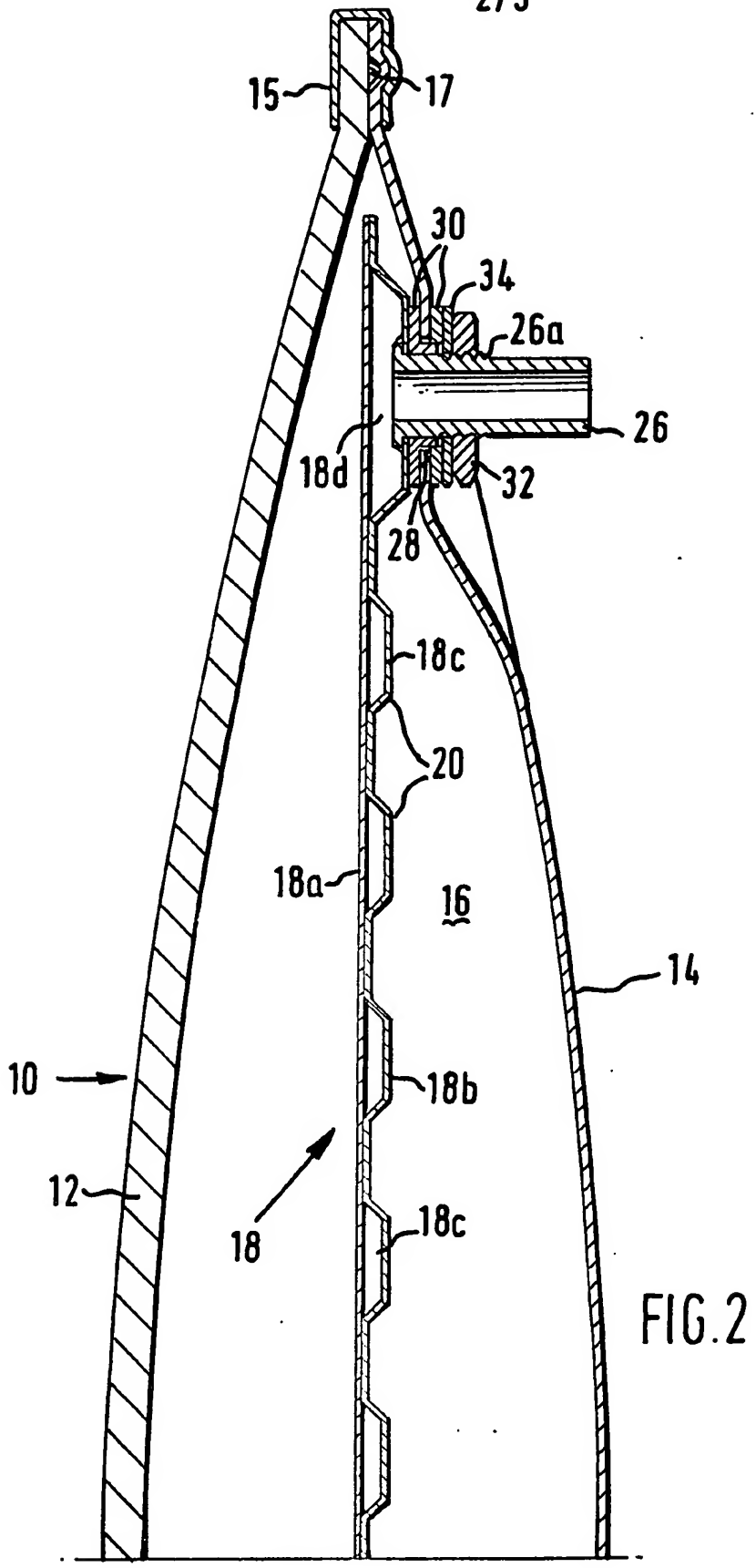
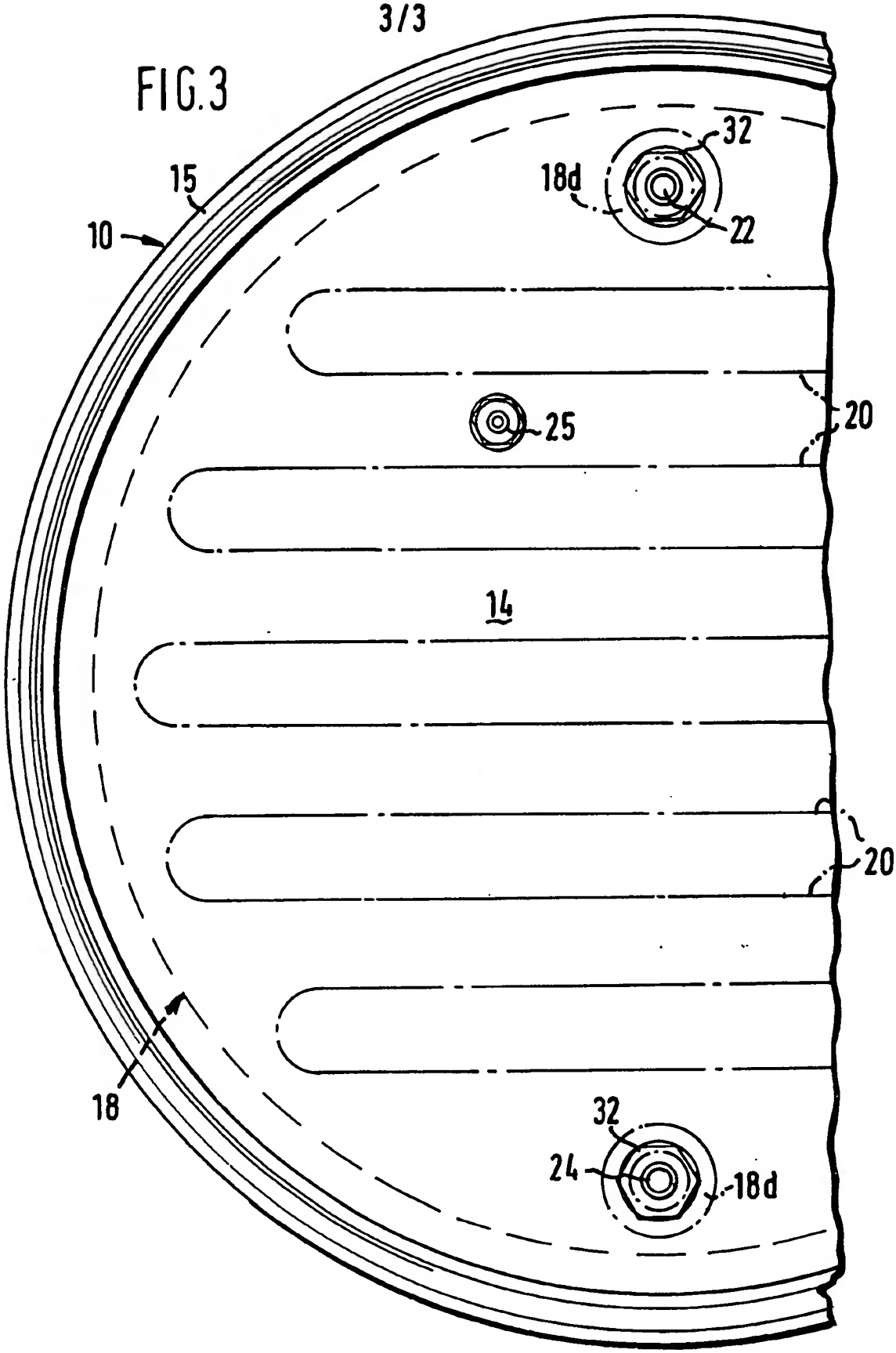


FIG.2

FIG.3



SPECIFICATION

Solar cell

This invention relates to solar cells.

According to the present invention, there is provided a solar cell comprising two outwardly domed members joined together at their peripheral edges in sealing relationship to provide an enclosed sealed space, and a heat exchanger plate located within the space and provided with passageways for the flow of a heat exchange medium, the space being under at least a partial vacuum, one of the domed members being transparent to radiation and the other being a radiation reflector.

An embodiment of the present invention will now be described by way of example only, with reference to the accompanying drawings, in which:-

Figure 1 is a side view of a solar cell according to the present invention,

Figure 2 is an enlarged detailed view of a water inlet/outlet of the cell, and

Figure 3 is a part-front view of the cell of Figure 1.

Referring to the drawings, the solar cell 10 includes two outwardly domed circular members 12,14 joined together, as by a flexible moulded ring 15 surrounding their peripheral edges, to provide an enclosed sealed space 16; an annular seal 17 is provided between the edges to seal the edges against the flow of air therebetween. Within the space is a circular plate-like heat exchanger 18 provided with passageways 20, arranged in serpentine configuration (see Figure 3), for the flow of a heat exchange medium, such as water, from an inlet 22 to a diametrically opposite outlet 24.

The solar cell is provided with a valve 25 in domed member 14 which allows the interior space 16 to be evacuated to a pressure below atmospheric, e.g. 14 lb/in^2 (96 k Pa) of vacuum. The heat exchanger 18 is formed from two circular aluminium or mild steel sheets 18*a*, 18*b* which are joined together at their peripheral edges, as by continuous welding, and between passageways 20, as by spot welding. Sheet 18*a* is generally flat, and sheet 18*b* is shaped and provided with recesses 18*c* to form the passageways 18 and also with enlarged recesses 18*d* to provide water inlet and outlet regions. The heat exchanger 18 is supported on domed member 14 at the inlet and outlet regions by means of two hollow support tubes 26 each extending (via a hole 28 in member 14) into a respective recess 18*d* and secured by welding to the sheet 18*d*. Sealing around each hole 28 is provided by two annular seals 30 (e.g. polycarbonate seals) and by a nut 32 which screws onto a threaded portion 26*a* of the tube to compress the seals and also to secure the heat exchanger to the domed member 14; a washer 34 is provided between the nut and an adjacent seal. The interior of each tube 26 is in communication with its respective recess 18*d*.

Domed member 12 would be of a radiation transparent material such as that known under the Trade Name Perspex, and the member 14 would be of a radiation reflecting material such as aluminium.

To increase the efficiency of the exchange of heat from radiation passing through member 12 to the water flowing through passageways 20, the exposed surface of plate 18*a* is provided with a matt black finish or with a coating of a material such as that known under the Trade Name Nico-Bond.

By imposing a high vacuum within the space 16, the efficiency of the solar cell is improved significantly since radiation on entering the solar cell is efficiently contained therein and little is lost back to the atmosphere. Because of the high vacuum, there is a restriction on the overall size of the cell. With a Perspex member 12 of 6 mm thick and an aluminium member 14 of 2 mm thick, the overall diameter of the cell would be in the region of 2 feet (0.61 metres).

CLAIMS

1. A solar cell comprising two outwardly domed members joined together at their peripheral edges in sealing relationship to provide an enclosed sealed space, and a heat exchanger plate located within the space and provided with passageways for the flow of a heat exchange medium, the space being under at least a partial vacuum, one of the domed members being transparent to radiation and the other being a radiation reflector.

2. The solar cell of Claim 1, wherein the heat exchanger plate is formed from two metal sheets joined together at their peripheral edges and between the passageways, one sheet being generally flat and the other sheet being shaped to provide the passageways.

3. The solar cell of Claim 1 or 2, wherein the passageways extend in a serpentine fashion between a medium inlet and outlet.

4. The solar cell of any one of the preceding Claims, wherein the heat exchanger plate is supported on one of the domed members by two diametrically opposed support structures which also respectively provide the medium inlet and outlet.

5. The solar cell of Claim 4, wherein the plate is supported on the radiation reflector member.

6. The solar cell of Claim 4 or 5, wherein each support is provided by a tube secured at one end to the plate and passing through a hole in the domed member, the tube being sealed and secured to the domed member.

7. The solar cell of any one of the preceding Claims, wherein the plate supporting domed member is of metal and the other domed member is of a suitable plastics material.

8. The solar cell of any one of the preceding Claims, wherein the domed members are joined at their edges by a flexible ring surrounding the edges, an annular seal being provided between the edges.

9. A solar cell substantially as herein described and shown in the accompanying drawings.

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